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IS 7460 (1988): Tolerances for tapered roller bearings [PGD 13: Bearing]



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Indian Standard

TOLERANCES FOR
TAPERED ROLLER BEARINGS

(First Revision)

1. Scope — Covers the tolerances for tapered roller bearings with boundary dimensions conforming to IS : 7461-1974 'General plan of boundary dimensions for tapered roller bearings'.

1.1 It also covers the tolerances for the effective width of tapered roller bearing sub-units and for outside flange diameter of tapered roller bearing with flanged outer ring.

2. Definitions — Definitions of the concepts to which the tolerances specified in this standard apply are given in IS : 11027-1984 'Definition of tolerances for rolling bearings' and IS : 2399-1988 'Rolling bearings — Vocabulary (first revision)'.

3. Symbols

d	= bearing bore diameter, nominal	T_1	= effective width of inner sub-unit, nominal
Δ_{ds}	= deviation of a single bore diameter	Δ_{Bs}	= deviation of a single inner ring width
Δ_{dmp}	= single plane mean bore diameter deviation (for a basically tapered bore Δ_{dmp} refers only to the theoretical small end of bore)	C	= outer ring width, nominal
V_{dp}	= bore diameter variation in a single radial plane	Δ_{Cs}	= deviation of a single outer ring width
V_{dmp}	= mean bore diameter variation (this applies only to a basically cylindrical bore)	K_{ia}	= radial runout of assembled bearing inner ring
D	= bearing outside diameter, nominal	K_{ea}	= radial runout of assembled bearing outer ring
D_1	= outer ring flange outside diameter, nominal	S_d	= inner ring reference face (backface, where applicable) runout with bore
Δ_{Ds}	= deviation of a single outside diameter	S_D	= variation of bearing outside surface generatrix inclination with outer ring reference face (backface)
Δ_{Dmp}	= single plane mean outside diameter deviation	S_{ia}	= assembled bearing inner ring face (backface) runout with raceway
V_{Dp}	= outside diameter variation in a single radial plane	S_{ea}	= assembled bearing outer ring face (backface) runout with raceway
V_{Dmp}	= mean outside diameter variation	Δ_{T1s}	= deviation of the actual effective width of inner sub-unit
B	= inner ring width, nominal	T_2	= effective width of outer sub-unit, nominal
T	= bearing width, nominal	Δ_{T2s}	= deviation of the actual effective width of outer sub-unit.
Δ_{Ts}	= deviation of the actual bearing width		

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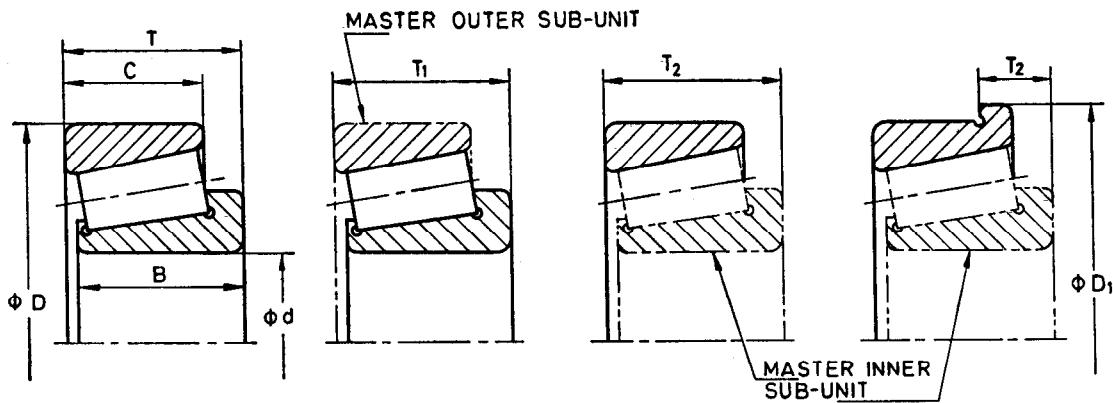


FIG. 1 SYMBOLS FOR TAPERED ROLLER BEARINGS[†]

4. Tolerances

4.1 Bore diameter tolerances given apply to basically cylindrical bores. Tolerances for tapered bores are given in 4.2 of IS : 5692-1988 'Tolerances for radial rolling bearing (first revision)'.

4.1.1 Normal tolerance class.

TABLE 1 DIAMETER AND RADIAL RUNOUT — INNER RING
Tolerance values in micrometres

<i>d</i> mm		Δ_{dmp}		<i>V</i> _{dp}	<i>V</i> _{dmp}	<i>K</i> _{ia}
Over	Including	High	Low	Max	Max	Max
10	18	0	−12	12	9	15
18	30	0	−12	12	9	18
30	50	0	−12	12	9	20
50	80	0	−15	15	11	25
80	120	0	−20	20	15	30
120	180	0	−25	25	19	35
180	250	0	−30	30	23	50
250	315	0	−35	35	26	60
315	400	0	−40	40	30	70

TABLE 2 DIAMETER AND RADIAL RUNOUT — OUTER RING
Tolerance values in micrometres

<i>D</i> mm		Δ_{Dmp}		<i>V</i> _{Dp}	<i>V</i> _{Dmp}	<i>K</i> _{oe}
Over	Including	High	Low	Max	Max	Max
18	30	0	−12	12	9	18
30	50	0	−14	14	11	20
50	80	0	−16	16	12	25
80	120	0	−18	18	14	35
120	150	0	−20	20	15	40
150	180	0	−25	25	19	45
180	250	0	−30	30	23	50
250	315	0	−35	35	26	60
315	400	0	−40	40	30	70
400	500	0	−45	45	34	80
500	630	0	−50	50	38	100

Note — The tolerance for the outside diameter of an outer ring flange, *D*₁, is h9.

TABLE 3 WIDTH — INNER AND OUTER RING, SINGLE ROW BEARING, AND SINGLE ROW SUB-UNITS

Tolerance values in micrometres

d mm		Δ_{Bs}		Δ_{Cs}		Δ_{Ts}		Δ_{T1s}		Δ_{T2s}	
Over	Including	High	Low	High	Low	High	Low	High	Low	High	Low
10	18	0	-120	0	-120	+200	0	+100	0	+100	0
18	30	0	-120	0	-120	+200	0	+100	0	+100	0
30	50	0	-120	0	-120	+200	0	+100	0	+100	0
50	80	0	-150	0	-150	+200	0	+100	0	+100	0
80	120	0	-200	0	-200	+200	-200	+100	-100	+100	-100
120	180	0	-250	0	-250	+350	-250	+150	-150	+200	-100
180	250	0	-300	0	-300	+350	-250	+150	-150	+200	-100
250	315	0	-350	0	-350	+350	-250	+150	-150	+200	-100
315	400	0	-400	0	-400	+400	-400	+200	-200	+200	-200

4.1.2 Tolerance class 6X

4.1.2.1 The diameter and radial runout tolerances for inner and outer rings of this tolerance class are same as those given in Tables 1 and 2 for the normal class.

Width tolerances are given in Table 4.

TABLE 4 WIDTH — INNER AND OUTER RING, SINGLE ROW BEARING AND SINGLE ROW SUB-UNITS

Tolerance values in micrometres

d mm		Δ_{Bs}		Δ_{Cs}		Δ_{Ts}		Δ_{T1s}		Δ_{T2s}	
Over	Including	High	Low	High	Low	High	Low	High	Low	High	Low
10	18	0	-50	0	-100	+100	0	+50	0	+50	0
18	30	0	-50	0	-100	+100	0	+50	0	+50	0
30	50	0	-50	0	-100	+100	0	+50	0	+50	0
50	80	0	-50	0	-100	+100	0	+50	0	+50	0
80	120	0	-50	0	-100	+100	0	+50	0	+50	0
120	180	0	-50	0	-100	+150	0	+50	0	+100	0
180	250	0	-50	0	-100	+150	0	+50	0	+100	0
250	315	0	-50	0	-100	+200	0	+100	0	+100	0
315	400	0	-50	0	-100	+200	0	+100	0	+100	0

4.1.3 Tolerance class 5

TABLE 5 INNER RING AND SINGLE ROW BEARING WIDTH

Tolerance values in micrometres

<i>d</i> mm		Δ_{dmp}		V_{dp}	V_{dmp}	K_{ia}	S_d	Δ_{Bs}		Δ_{Ts}	
Over	Including	High	Low	Max	Max	Max	Max	High	Low	High	Low
10	18	0	−7	5	5	5	7	0	−200	+200	−200
18	30	0	−8	6	5	5	8	0	−200	+200	−200
30	50	0	−10	8	5	6	8	0	−240	+200	−200
50	80	0	−12	9	6	7	8	0	−300	+200	−200
80	120	0	−15	11	8	8	9	0	−400	+200	−200
120	180	0	−18	14	9	11	10	0	−500	+350	−250
180	250	0	−22	17	11	13	11	0	−600	+350	−250

TABLE 6 OUTER RING

Tolerance values in micrometres

<i>D</i> mm		Δ_{Dmp}		V_{Dp}	V_{Dmp}	K_{es}	S_D	Δ_{Cs}	
Over	Including	High	Low	Max	Max	Max	Max	High	Low
18	30	0	−8	6	5	6	8	Identical Δ_{Bs} of inner ring of same bearing	
30	50	0	−9	7	5	7	8		
50	80	0	−11	8	6	8	8		
80	120	0	−13	10	7	10	9		
120	150	0	−15	11	8	11	10		
150	180	0	−18	14	9	13	10		
180	250	0	−20	15	10	15	11		
250	315	0	−25	19	13	18	13		
315	400	0	−28	22	14	20	13		

Note — The tolerance for the outside diameter of an outer ring flange, D_1 , is h9.

4.1.4 Tolerance class 4

TABLE 7 INNER RING AND SINGLE ROW BEARING WIDTH

Tolerance values in micrometres

<i>d</i> mm		Δ_{dmp}		Δ_{ds}		V_{dp}	V_{dmp}	K_{ia}	S_d	S_{ia}	Δ_{Bs}		Δ_{Ts}	
Over	Including	High	Low	High	Low	Max	Max	Max	Max	Max	High	Low	High	Low
10	18	0	−5	0	−5	4	4	3	3	3	0	−200	+200	−200
18	30	0	−6	0	−6	5	4	3	4	4	0	−200	+200	−200
30	50	0	−8	0	−8	6	5	4	4	4	0	−240	+200	−200
50	80	0	−9	0	−9	7	5	4	5	4	0	−300	+200	−200
80	120	0	−10	0	−10	8	5	5	5	5	0	−400	+200	−200
120	180	0	−13	0	−13	10	7	6	6	7	0	−500	+350	−250
180	250	0	−15	0	−15	11	8	8	7	8	0	−600	+350	−250

TABLE 8 OUTER RING

Tolerance values in micrometres

D mm		Δ_{Dmp}		Δ_{Ds}		V_{Dp}	V_{Dmp}	K_{ea}	S_D	S_{ea}	Δ_{Cs}	
Over	Including	High	Low	High	Low	Max	Max	Max	Max	Max	High	Low
18	30	0	—6	0	—6	5	4	4	4	5	Identical to Δ_{Bs} of inner ring of same bearing	
30	50	0	—7	0	—7	5	5	5	4	5		
50	80	0	—9	0	—9	7	5	5	4	5		
80	120	0	—10	0	—10	8	5	6	5	6		
120	150	0	—11	0	—11	8	6	7	5	7		
150	180	0	—13	0	—13	10	7	8	5	8		
180	250	0	—15	0	—15	11	8	10	7	10		
250	315	0	—18	0	—18	14	9	11	8	10		
315	400	0	—20	0	—20	15	10	13	10	13		

Note — The tolerance for the outside diameter of an outer ring flange, D_1 , is h9.

EXPLANATORY NOTE

This standard was originally published in 1974. The revision has been taken up to incorporate the changes agreed at the international level as reflected in the latest revision of ISO 492-1986 'Rolling bearings — Radial bearing — Tolerances'.

In this revision, symbols for various dimensions and tolerances have been standardized. The tolerance values for certain deviations under various tolerance classes have also been rationalized. However, no change has been made with respect to the effective width and outside flange diameter tolerances for tapered roller bearings.

This standard is in full conformity with ISO 492-1986.